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Growth Measurements of Holstein, Ayrshire, Guernsey and Jersey Males

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189**

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**Growth Measurements of
Holstein, Ayrshire, Guernsey
and Jersey Males**

**by
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SUMMARY

This study was based on monthly observations of all Holstein, Ayrshire, Guernsey and Jersey males born in the University of Nebraska dairy herd between 1922 and 1942. There were varying numbers of animals for the different months of age for the several breeds.

Measurements of weight, slope of the rump, thickness of skin, and 13 linear measurements were taken monthly, from birth to disposal of the animals. The linear measurements were of heights at withers, hooks and rump; of lengths—diagonal (shoulder point to pinbone), body and rump; of widths at chest, hooks and pinbones; of depths at chest and barrel; and of girths at chest and barrel.

Growth as measured by gains in dimensional measurements was usually greatest between the third and twelfth month. The gain pat-

tern was quite uniform for each measurement. The slope of the rump was usually greatest at birth, declined until the fourth to the sixth month, and then tended to increase. The thickness of the hide was usually slightly less at the fore rib than at the last rib. The thickness increased in both locations until about one year, after which the changes were minor.

Using birth measurement as a base, the monthly relationship of each single measurement including weight was computed. A similar calculation was made for the group measurements of height, length, depth and girth. The animals of the several breeds were much alike in such a computation, although the Jerseys tended to show a higher relationship at each monthly interval and for each measurement, than males of the other breeds.

Growth Measurements of Holstein, Ayrshire, Guernsey and Jersey Males

H. P. Davis and I. L. Hathaway¹

In growth studies of dairy cattle in the University of Nebraska herd, carried on from 1922 to 1942, monthly observations were made of weight, skin thickness, and angle of the rump. In addition, thirteen linear measurements were made each month. These included: three heights—at withers, at hooks, and at pinbones; three lengths—body (top line), diagonal (shoulder point to pinbones), and rump; three widths—at chest, at hooks and at pinbones; two depths—at chest and at barrel; and two girths—chest and barrel. In previous publications, similar data have been presented for Holstein females (12) and for Ayrshire, Guernsey and Jersey females (13).

This presentation includes a series of tables based on monthly averages (calculated as five-month moving averages) for the several measurements, the monthly gain for each measurement and figures representing the relationship of each monthly average to the initial, or birth, measurement. The five-month moving averages indicate trends and are particularly

useful with decreasing numbers of individuals. Using birth or first measurement as an index provides a means of comparing animals of different breeds and sizes as to the rate of growth at different periods of their development.

To indicate something of the genetic background of the males included in the study, the birth or initial measurement data were based upon the following numbers for the several breeds: Holsteins 220 (sired by 29 different bulls); Ayrshires 58 (sired by 9 different bulls); Guernseys 25 (sired by 11 different bulls); and Jerseys 95 (sired by 14 different bulls). Since the animals were measured only so long as they remained in the herd, the number constantly decreased with advancing age. The males whose measurements are reported here were by the same sires as the females reported in previous publications (12, 13), so comparisons can be made between growth of males and females. The feeding and management practices used in handling the animals and detailed procedures for taking the measurements were described in a previous publication (12).

The literature regarding dairy cattle growth has been confined almost entirely to females. Previous growth studies of males have not presented an orderly picture of

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During the study described here, Ray F. Morgan had charge of taking the measurements and was assisted at various times by E. N. Hansen and G. W. Trimmer.

growth, but have often covered only a short period and have been used to test the effectiveness of some feeding or management procedure during a certain period of calf growth. Growth measurements of steers have been of a similar character. It therefore seems important to present measurement data for dairy males, taken at regular intervals under standard conditions of measurement and of feeding and management, in order to establish some norm of development for males.

REVIEW OF LITERATURE

Growth is a natural expanding process by which an organism increases in external size in all directions at a rather uniform, but not constant rate (*1, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 20, 21, 22, 23, 24, 25, 26, 27, 28*). Of the various environmental factors that affect growth, nutrition appears to be the most important (*1, 2, 3, 10, 14, 15, 20, 21, 24, 29*). Other factors and a more complete discussion of growth appeared in a previous publication (*12*). Winchester and Howe (*29*) discuss at some length the effect of the plane of nutrition upon growth in beef cattle and particularly in steers. The accuracy of measurements of cattle is discussed by Lush and associates (*18, 19*).

PRESENTATION OF DATA AND DISCUSSION

The data for the average monthly measurements, the monthly gains and the relation of the monthly measurements to birth as an index are shown in tables 1 through 14.

Listed in those tables are the numbers of individuals composing each monthly average, the five-month moving average for the measurement for each age, the increased growth or gain for the month over the previous measurement, and the relationship of each monthly measurement to birth as an index. Such a presentation makes possible a comparison of the growth pattern at different ages for males of the different dairy breeds. In table 15, which presents data on skin thickness, and table 16, which presents rump slope data, the monthly gains and relationship to birth columns have been eliminated. The small monthly gains in each case made their presentation of little value.

Weight Measurements

In table 1 are shown the weights by ages. More data are presented for Holsteins because of their longer age span. For the first month the average daily gain was 0.75 lb. This was nearly doubled the second month, with a further increase for the third month. From the fourth to the thirteenth months the daily gain was about 2 lbs., after which it declined somewhat and became irregular. For six months the daily gain was 1.75 lbs. and for twelve months it was 1.96 lbs. The relationship to birth indicates that weight doubles within three months, doubles again at six months, and shows a further doubling at twelve months. At the maximum, twenty-seven months, the weight had increased to fifteen times birth weight.

For the other breeds the daily

gains for six months were as follows: Ayrshire 1.25 lbs.; Guernsey 1.13 lbs.; and Jersey 1.07 lbs. For twelve months the daily gains were: Ayrshire 1.52 lbs.; and Jersey 1.59 lbs. No data are available for Guernseys. At three months the males of all breeds had approximately doubled their weights, with Jerseys showing the greatest gain over birth, 2.24 times. At six months the Ayrshires and Guernseys had not grown so rapidly, the relationship to birth being 3.83 for Ayrshires and 3.64 for Guernseys. Jerseys on the other hand were 4.33 times birth weight compared with Holsteins which were 4.19 times birth weight.

Height

Tables 2 to 4 are presentations of height data, with table 2 showing the heights at withers. The heights at birth were as follows: Holsteins 75.5 cm.; Ayrshires 69.5 cm.; Guernseys 71.5 cm.; Jerseys 65.2 cm. At three months the relationships to birth for the breeds were as follows: Holsteins 1.16; Ayrshires 1.15; Guernseys 1.14 and Jerseys 1.18. At six months these relationships were: Holsteins 1.36; Ayrshires 1.33; Guernseys 1.34 and Jerseys 1.37. At twelve months the relationships to birth were: Holsteins 1.62; Ayrshires 1.62 and Jerseys 1.72. In the case of Holsteins the relationship to birth at 27 months was approaching 2. During the younger ages the males of the four breeds gained rather uniformly in height at withers in relationship to the birth measurement.

Height at hook measurements

are shown in table 3. At birth the heights at hooks exceeded the heights at withers as follows: Holsteins 3.2 cm; Ayrshires 2.7 cm.; Guernseys 3.3 cm.; and Jerseys 2.7 cm. Throughout the measurement period, the hooks in most cases continued to be higher than the pinbones (table 4). The margin was usually wider at later ages. At three and at six months of age the relationships to birth were respectively: Holsteins 1.16 and 1.35; Ayrshires 1.15 and 1.32; Guernseys 1.13 and 1.31; and Jerseys 1.16 and 1.35. These were very similar to the relationships for height at withers at three and six months. At twelve months the relationships to birth were: Holsteins 1.59; Ayrshires 1.59; and Jerseys 1.69. Again, these relationships were very similar to the height-at-withers relationships for the same age. The increases in height for the six- and twelve-month periods were also much alike.

Measurements for heights at pinbones are shown in table 4. At birth these measurements were much like the heights at withers. Growth, in terms of birth measurements, was slightly greater for the three- and six-month periods than for height at withers and height at hooks. The relationships to birth are shown for three and six months respectively: Holsteins 1.19 and 1.39; Ayrshires 1.17 and 1.31; Guernseys 1.18 and 1.36; and Jerseys 1.21 and 1.39. The twelve-month relationships were: Holsteins 1.61; Ayrshires 1.60; and Jerseys 1.74. The six-month gains for height at withers, height at hooks

and height at pinbones were respectively: Holsteins 27.4, 27.7 and 30.0 cm.; Ayrshires 23.2, 23.1 and 21.7 cm.; Guernseys 24.0, 23.5 and 25.7 cm.; and Jerseys 24.4, 24.0 and 25.1 cm. For twelve months the gains were: Holsteins 46.5, 46.7 and 46.6 cm.; Ayrshires 43.2, 42.5 and 41.9 cm.; and Jerseys 46.8, 47.1 and 48.0 cm. It is evident that height gains, as shown by the three kinds of measurements, were very uniform for the four breeds. The Jerseys gained slightly more in relation to birth.

Length

Length measurements are shown in tables 5 to 7. Table 5 shows diagonal length, that is, the measurement from the points of the shoulders to the extremity of the pinbones. At three and six months the measurement relationships to birth for the several breeds were respectively: Holsteins 1.29 and 1.60; Ayrshires 1.23 and 1.48; Guernseys 1.27 and 1.56; and Jerseys 1.30 and 1.58. At twelve months the relationships were: Holsteins 1.96; Ayrshires 1.92; and Jerseys 2.03. The gains for six and twelve months were respectively: Holsteins 43.0 and 69.4 cm.; Ayrshires 32.4 and 61.9 cm.; Guernseys 37.7 cm. (data not available for twelve months); and Jerseys 35.9 and 64.2 cm.

Body length measurements are shown in table 6. The relationships of the three- and six-month measurements to the birth measurements for the different breeds were as follows: Holsteins 1.29 and 1.60; Ayrshires 1.25 and 1.53; Guernseys 1.38 and 1.62; and Jerseys 1.32 and

1.61. For the twelve-month measurements the relationships were: Holsteins 1.98; Ayrshires 1.98; and Jerseys 2.16. The gains for six and twelve months were respectively: Holsteins 37.0 and 59.9 cm.; Ayrshires 29.5 and 55.0 cm.; Guernseys 35.3 cm. (no data available for twelve months); and Jerseys 31.8 and 61.3 cm.

Rump length measurements are shown in table 7. The relationships to birth of the measurements at three and six months for the several breeds are as follows: Holsteins 1.26 and 1.58; Ayrshires 1.23 and 1.47; Guernseys 1.25 and 1.50; and Jerseys 1.26 and 1.52. For twelve months the relationships to birth measurements were as follows: Holsteins 1.95; Ayrshires 2.00; and Jerseys 2.08. The actual gains for six and twelve months were respectively: Holsteins 12.2 and 20.2 cm.; Ayrshires 9.1 and 19.3 cm.; Guernseys 9.6 cm. (data lacking for twelve months); and Jerseys 9.7 and 20.0 cm.

Taking length measurements as a whole the three-months relationships for diagonal, body and rump lengths respectively were: Holsteins 1.29, 1.29 and 1.26; Ayrshires 1.23, 1.25 and 1.23; Guernseys 1.27, 1.38 and 1.25; and Jerseys 1.30, 1.32 and 1.26. At six months the relationships were: Holsteins 1.60, 1.60 and 1.58; Ayrshires 1.48, 1.53 and 1.47; Guernseys 1.56, 1.62 and 1.50; and Jerseys 1.58, 1.61 and 1.52. Thus, based on birth measurements, growth in length appears to progress at a very uniform rate and also appears to show a close relationship between the breeds.

Width

Width measurement figures are shown in tables 8 to 10. Table 8 shows chest widths by monthly periods. At three months of age the chest width measurements showed the following relationships to birth measurements: Holsteins 1.26; Ayrshires 1.20; Guernseys 1.18; and Jerseys 1.21. At six months the measurements showed the following relationships to birth: Holsteins 1.63; Ayrshires 1.52; Guernseys 1.53; and Jerseys 1.55. At twelve months the relationships were: Holsteins 2.20; Ayrshires 2.08; and Jerseys 2.30.

Measurements for width at hooks are given in table 9. These measurements indicate the changes represented by growth of the skeleton in that area. At three months of age the measurements showed relationships to birth as follows: Holsteins 1.33; Ayrshires 1.29; Guernseys 1.29; and Jerseys 1.37. By six months the measurement relationships to birth were: Holsteins 1.75; Ayrshires 1.69; Guernseys 1.70; and Jerseys 1.80. At twelve months the relationships were: Holsteins 2.33; Ayrshires 2.37; and Jerseys 2.70. At twenty-four months Holsteins showed a width at hooks which was approximately three times the birth measurement (actually 2.99). While data are limited, it appears that Jerseys increased in that measure-

ment at a faster rate than the other breeds.

The width figures for pinbones are shown in table 10. The relationships of the three-month measurements to birth rate were as follows: Holsteins 1.30; Ayrshires 1.24; Guernseys 1.25; and Jerseys 1.29. By six months these relationships were: Holsteins 1.68; Ayrshires 1.61; Guernseys 1.63; and Jerseys 1.67. At twelve months these relationships were: Holsteins 2.31; Ayrshires 2.19; and Jerseys 2.56.

Considering the three width measurements together the comparisons with birth for three, six and twelve months were as shown in the table below.

The gains in width dimensions progressed rather uniformly at the several ages using birth as a basis although there were some breed variations, especially at the older ages.

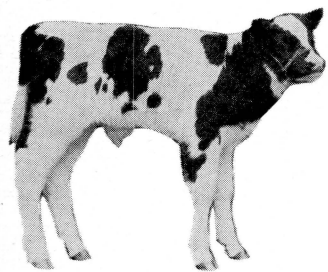
Depth

Depth measurements of the chest and barrel are shown in tables 11 and 12, respectively. At birth the chest depths were the same or fractionally greater than the barrel depth, a not unexpected situation. For chest measurements (table 11) the relationships at three, six and twelve months respectively were as follows: Holsteins 1.29, 1.61 and 2.06; Ayrshires 1.26, 1.57 and 2.07;

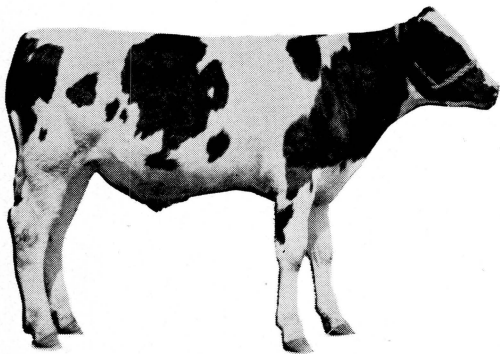
Relationship of Widths with Measurements at Birth

	Three months			Six months			Twelve months		
	<i>Chest</i>	<i>Hooks</i>	<i>Pinbones</i>	<i>Chest</i>	<i>Hooks</i>	<i>Pinbones</i>	<i>Chest</i>	<i>Hooks</i>	<i>Pinbones</i>
Holsteins	1.26	1.33	1.30	1.63	1.75	1.68	2.20	2.33	2.31
Ayrshires	1.20	1.29	1.24	1.52	1.69	1.61	2.08	2.37	2.19
Guernseys	1.18	1.29	1.25	1.53	1.70	1.63	not available		
Jerseys	1.21	1.37	1.29	1.55	1.80	1.67	2.30	2.70	2.56

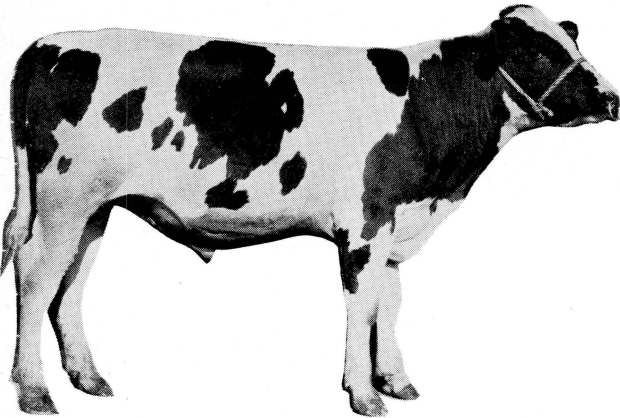
Comparison of size for a Holstein male at different ages. Photographs taken at a uniform distance.



Birth

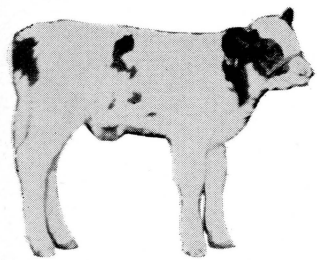


Age: 6 months

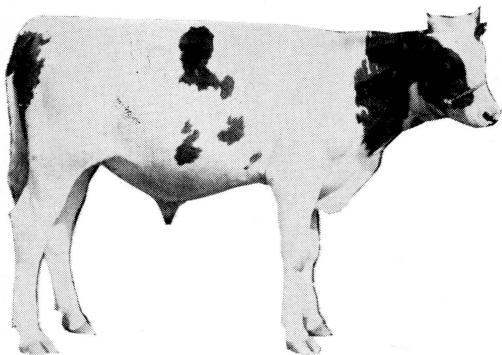


Age: 12 months

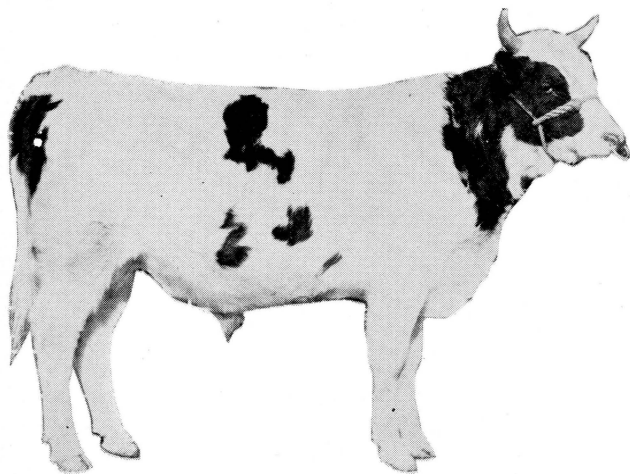
Comparison of size for an Ayrshire male at different ages. Photographs taken at a uniform distance.



Birth

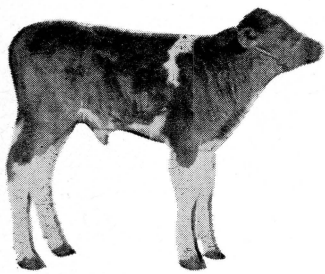


Age: 6 months

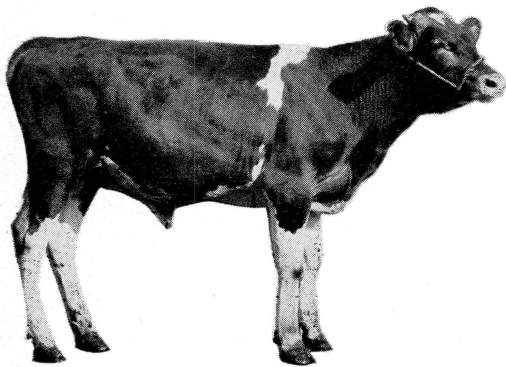


Age: 12 months

Comparison of size for a Guernsey male at different ages. Photographs taken at a uniform distance.

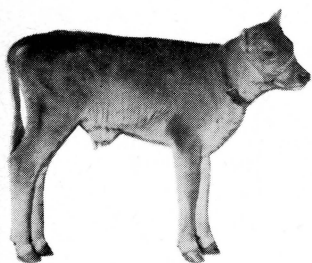


Birth

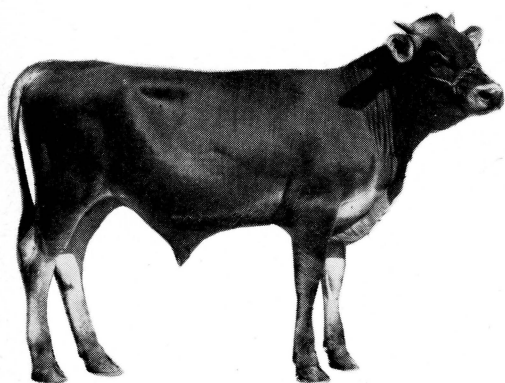


Age: 6 months

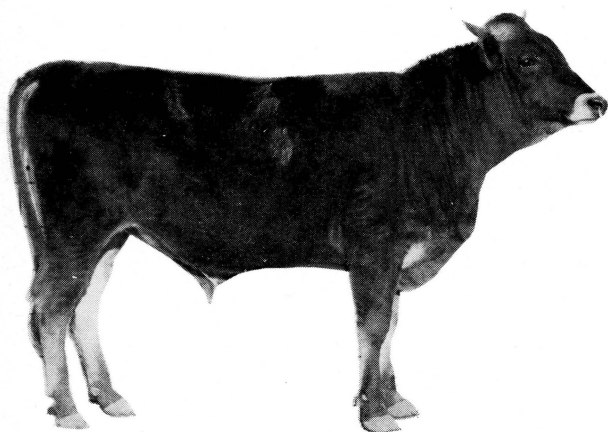
Comparison of size for a Jersey male at different ages. Photographs taken at a uniform distance.



Birth



Age: 6 months



Age: 12 months

Guernseys 1.25 and 1.59 (data not available for twelve months); and Jerseys 1.33, 1.67 and 2.31. Similar relationships are presented in table 12 for depth of barrel for the three-, six- and twelve-month periods: Holsteins 1.37, 1.78 and 2.23; Ayrshires 1.34, 1.74 and 2.19; Guernseys 1.33 and 1.75 (data not available for twelve months); and Jerseys 1.40, 1.85 and 2.39. As the paunch develops, the barrel increases more rapidly in depth than the chest and results in an increasing spread between the two measurements.

Girth

Tables 13 and 14 show girth measurements. It will be noted in table 13 that the increase in chest girth was greatest in the fourth month (Guernseys were the exception) and in general thereafter there was a decline. The average gain of the Holstein males for the first six months was 47.5 cm. This was larger than for the other three breeds, which were much alike. The twelve-month gain for the Jerseys was almost equal to that of the Holsteins.

The relationship of the measurements to birth were as follows for six and twelve months: Holsteins 1.59 and 2.05; Ayrshires 1.53 and 2.02; Guernseys 1.53 (data not available for twelve months); and Jerseys 1.60 and 2.24.

In table 14 barrel girth measurements are shown. At birth these were only slightly greater than the chest girth measurements, varying as follows: Holstein 1.5 cm.; Ayrshires 3.6 cm.; Guernseys 2.3 cm.; and Jerseys 2.7 cm. At six months

these differences between barrel and chest girth were as follows: Holsteins 26.6 cm.; Ayrshires 28.3 cm.; Guernseys 25.0 cm.; and Jerseys 23.4 cm. The variations between barrel girths and chest girths at birth and at six months of age were not unexpected. On the basis of relationship to birth, the six- and twelve-month measurements were as follows: Holsteins 1.89 and 2.37; Ayrshires 1.81 and 2.34; Guernseys 1.81 (data not available for twelve months); and Jerseys 1.88 and 2.59.

Hide Thickness

Hide thicknesses were measured in millimeters and represent double the actual measurements because they were taken at a fold in the skin. Data on hide measurements taken at the fore rib and at the last rib are shown in table 15. The first month for each breed represented a slight decrease and thereafter there was a gradual increase in thickness up to an age somewhere between the twelfth and eighteenth months after which it appeared that the hide thickness became stabilized. At birth the hide thicknesses for fore rib and last rib were either the same (as in the case of Jerseys) or the fore rib measurements were slightly lower. While the differences were very small throughout the period of the study, the fore rib thicknesses were usually slightly less.

Angle of Rump

The angles of inclination or slope of the rump as determined by a clinometer placed on the top processes of the hooks and pin-bones are shown in table 16 in

terms of plus degrees. That is, the hooks were always higher than the pinbones. In general, for all breeds, the slope decreased from birth to the sixth or seventh month and then increased. It is recognized that in taking birth measurements there is some difficulty in posing the animal so as to obtain a natural position. This may explain at least in part the higher slopes at birth. Attempting to judge the slope of the rump at an early age for dairy males would not seem to give an accurate estimate of later rump slope.

Relationships

A study of the tables makes it clear that growth in dairy males progresses in an orderly manner and that the several breeds show a great uniformity in the pattern of growth. Since the males of the different breeds varied in their size at birth, the birth measurement for the males of each breed may well serve as an index by which growth in different areas and directions may be measured.

Measurements of height, length, width and depth show considerable similarity. For example, the height measurements relationship at six months shows variations for the three measurements of height at withers, at hooks and at pinbones. In that order the relationships to birth for the several breeds are as follows: Holsteins 1.36, 1.35 and 1.39; Ayrshires 1.33, 1.32 and 1.31; Guernseys 1.34, 1.31 and 1.36;

and Jerseys 1.37, 1.35 and 1.39. Similar close relationships are present at the same age for the length measurements. Thus, for diagonal, body and rump lengths respectively, the relationships are: Holsteins 1.60, 1.60 and 1.58; Ayrshires 1.48, 1.53 and 1.47; Guernseys 1.56, 1.62 and 1.50; and Jerseys 1.58, 1.61 and 1.52.

Width relationships at six months are not quite so close, but the figures for relationship to birth for chest, hook and pinbone widths are: Holsteins 1.63, 1.75 and 1.68; Ayrshires 1.52, 1.69 and 1.61; Guernseys 1.53, 1.70 and 1.63; and Jerseys 1.55, 1.80 and 1.67.

Depth measurement relationships at six months for chest and barrel respectively are: Holsteins 1.61 and 1.78; Ayrshires 1.57 and 1.74; Guernseys 1.59 and 1.75; and Jerseys 1.67 and 1.85. As might be expected, the six-month measurements of chest and barrel girths show greater variations. At six months the relationships to birth were as follows: Holsteins 1.59 and 1.89; Ayrshires 1.53 and 1.81; Guernseys 1.53 and 1.81; and Jerseys 1.60 and 1.88.

If the relationships for the thirteen linear measurements are merged and averaged, the relationships at six and twelve months to the birth measurements are as follows: Holsteins 1.60 and 2.02; Ayrshires 1.53 and 2.00; Guernseys 1.56 (no data available for twelve months); and Jerseys 1.60 and 2.19.

TABLES

Tables 1 to 16, mentioned throughout the text, follow on pages 14 to 29.

Table 1.—Monthly weights, and gains in weight, and comparisons with birth weights as an index for Holsteins, Ayrshire, Guernsey, and Jersey males.

Age in months	HOLSTEIN					AYRSHIRE					GUERNSEY					JERSEY				
	Animals	Wt. Av.	Weight gain		Relation to birth	Animals	Wt. Av.	Weight gain		Relation to birth	Animals	Wt. Av.	Weight gain		Relation to birth	Animals	Wt. Av.	Weight gain		Relation to birth
			month	daily				month	daily				month	daily				month	daily	
Birth	no.	lbs.*	lbs.	lbs.		no.	lbs.*	lbs.	lbs.		no.	lbs.*	lbs.	lbs.		no.	lbs.*	lbs.	lbs.	
1	220	100	.....	.....	1.00	58	81	.....	.....	1.00	25	78	.....	.....	1.00	95	58	.....	.....	1.00
2	186	123	23	0.75	1.23	42	104	23	0.76	1.28	19	91	13	0.43	1.17	79	71	13	0.43	1.22
3	158	167	44	1.44	1.67	29	128	24	0.79	1.58	17	117	26	0.85	1.50	65	99	28	0.92	1.71
4	145	218	51	1.67	2.18	23	164	36	1.18	2.02	14	152	35	1.15	1.95	57	130	31	1.02	2.24
5	129	281	63	2.07	2.81	16	212	48	1.57	2.62	10	186	34	1.11	2.38	51	167	37	1.21	2.88
6	117	348	67	2.20	3.48	12	262	50	1.64	3.23	9	233	47	1.54	2.99	41	207	40	1.31	3.57
7	104	419	71	2.33	4.19	12	310	48	1.57	3.83	8	284	51	1.67	3.64	31	251	44	1.44	4.33
8	76	492	73	2.39	4.92	10	350	40	1.31	4.32	6	368	84	2.75	4.72	23	298	47	1.54	5.14
9	76	562	70	2.30	5.62	6	396	46	1.51	4.89	3	450	82	2.69	5.77	13	349	51	1.67	6.02
10	65	632	70	2.30	6.32	4	453	57	1.87	5.59	.....	.....	.....	.....	.....	8	405	56	1.84	6.98
11	46	696	64	2.10	6.96	4	530	77	2.52	6.54	.....	.....	.....	.....	.....	5	474	69	2.26	8.17
12	40	756	60	1.97	7.56	3	587	57	1.86	7.25	.....	.....	.....	.....	.....	3	575	101	3.31	9.91
13	25	815	59	1.93	8.15	3	636	49	1.61	7.85	.....	.....	.....	.....	.....	1	640	65	2.13	11.03
14	17	870	55	1.80	8.70	1	705	69	2.26	8.70	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
15	10	930	60	1.97	9.30	1	769	64	2.10	9.49	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
16	9	986	56	1.84	9.86	1	803	34	1.11	9.91	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
17	7	1050	64	2.10	10.50	1	885	82	2.69	10.93	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
18	5	1104	54	1.77	11.04	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
19	4	1159	55	1.80	11.59	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
20	3	1225	66	2.16	12.25	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
21	3	1278	53	1.74	12.78	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
22	3	1324	46	1.51	13.24	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
23	3	1352	28	0.92	13.52	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
24	3	1383	31	1.02	13.83	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
25	2	1410	27	0.89	14.10	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
26	1	1450	40	1.31	14.50	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
27	1	1513	63	2.07	15.13	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
28	1	1521	8	0.26	15.21	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Total gain 6 months	.....	319	.....	.....	.....	.....	.....	229	.....	.....	.....	.....	206	.....	.....	.....	.....	193	.....	.....
Daily gain 6 months	.....	.....	1.75	.....	.....	.....	.....	.....	1.25	.....	.....	.....	.....	1.13	.....	.....	.....	.....	1.07	.....
Total gain 12 months	.....	715	.....	.....	.....	.....	.....	555	.....	.....	.....	.....	.....	.....	.....	.....	.....	582	.....	.....
Daily gain 12 months	.....	.....	1.96	.....	.....	.....	.....	.....	1.52	.....	.....	.....	.....	.....	.....	.....	.....	.....	1.59	.....
Month = 30.5 days	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

* Five-month moving average.

Table 2.—Monthly height at withers, gains in height at withers, and relationship of monthly measurements to birth of Holstein, Ayrshire, Guernsey and Jersey males.

Age in months	HOLSTEIN				AYRSHIRE				GUERNSEY				JERSEY			
	Animals	Height at withers (av. *)	Gain monthly	Relation to birth	Animals	Height at withers (av. *)	Gain monthly	Relation to birth	Animals	Height at withers (av. *)	Gain monthly	Relation to birth	Animals	Height at withers (av. *)	Gain monthly	Relation to birth
	<i>no.</i>	<i>cm.</i>	<i>cm.</i>		<i>no.</i>	<i>cm.</i>	<i>cm.</i>		<i>no.</i>	<i>cm.</i>	<i>cm.</i>		<i>no.</i>	<i>cm.</i>	<i>cm.</i>	
Birth	220	75.5	....	1.00	58	69.5	....	1.00	25	71.5	....	1.00	95	65.2	....	1.00
1	185	78.7	3.2	1.04	42	73.1	3.6	1.05	19	73.9	2.4	1.03	79	68.6	3.4	1.05
2	157	84.0	5.3	1.11	29	75.5	2.4	1.09	17	77.1	3.2	1.08	65	72.9	4.3	1.12
3	144	87.8	3.8	1.16	23	79.8	4.3	1.15	14	81.4	4.3	1.14	57	76.9	4.0	1.18
4	128	93.1	5.3	1.23	16	84.8	5.0	1.22	10	86.2	4.8	1.21	51	81.4	4.5	1.25
5	116	98.2	5.1	1.30	12	88.8	4.0	1.28	9	91.3	5.1	1.28	41	85.7	4.3	1.31
6	104	102.9	4.7	1.36	12	92.7	3.9	1.33	8	95.5	4.2	1.34	31	89.6	3.9	1.37
7	87	107.2	4.3	1.41	10	96.2	3.5	1.38	6	101.8	6.3	1.42	23	93.4	3.8	1.43
8	76	110.9	3.7	1.47	6	99.4	3.2	1.43	3	105.5	3.7	1.48	13	96.8	3.4	1.48
9	65	114.4	3.5	1.52	4	103.1	3.7	1.48	....	....	....	....	8	101.0	4.2	1.55
10	46	117.2	2.8	1.55	4	107.7	4.6	1.55	....	....	....	....	5	105.1	4.1	1.61
11	40	119.8	2.6	1.59	3	110.5	2.8	1.59	....	....	....	....	3	111.5	6.4	1.71
12	25	122.0	2.2	1.62	3	112.7	2.2	1.62	....	....	....	....	1	112.0	0.5	1.72
13	17	124.1	2.1	1.64	1	115.9	3.2	1.67	....	....	....	....	....	....	....	....
14	10	126.2	2.1	1.67	1	119.4	3.5	1.72	....	....	....	....	....	....	....	....
15	9	128.1	1.9	1.70	1	125.0	5.6	1.80	....	....	....	....	....	....	....	....
16	7	130.2	2.1	1.72	1	126.0	1.0	1.81	....	....	....	....	....	....	....	....
17	5	131.9	1.7	1.75	....	....	....	....	....	....	....	....	....	....	....	....
18	4	133.6	1.7	1.77	....	....	....	....	....	....	....	....	....	....	....	....
19	3	135.4	1.8	1.79	....	....	....	....	....	....	....	....	....	....	....	....
20	3	137.5	2.1	1.82	....	....	....	....	....	....	....	....	....	....	....	....
21	3	138.7	1.2	1.84	....	....	....	....	....	....	....	....	....	....	....	....
22	3	139.7	1.0	1.85	....	....	....	....	....	....	....	....	....	....	....	....
23	3	140.7	1.0	1.86	....	....	....	....	....	....	....	....	....	....	....	....
24	2	142.0	1.3	1.88	....	....	....	....	....	....	....	....	....	....	....	....
25	1	142.8	0.8	1.89	....	....	....	....	....	....	....	....	....	....	....	....
26	1	145.0	2.2	1.92	....	....	....	....	....	....	....	....	....	....	....	....
27	1	147.0	2.0	1.95	....	....	....	....	....	....	....	....	....	....	....	....
Total gain 6 months			27.4	....			23.2	....			24.0	....			24.4	....
Total gain 12 months			46.5	....			43.2	....				....			46.8	....

* Five-month moving average.

Table 3.—Monthly height at hooks, gains in height at hooks, and relationship to birth of Holstein, Ayrshire, Guernsey and Jersey males.

Age in months	HOLSTEIN				AYRSHIRE				GUERNSEY				JERSEY			
	Animals	Height at hooks (av.*)	Gain monthly	Relation to birth	Animals	Height at hooks (av.*)	Gain monthly	Relation to birth	Animals	Height at hooks (av.*)	Gain monthly	Relation to birth	Animals	Height at hooks (av.*)	Gain monthly	Relation to birth
	<i>no.</i>	<i>cm.</i>	<i>cm.</i>		<i>no.</i>	<i>cm.</i>	<i>cm.</i>		<i>no.</i>	<i>cm.</i>	<i>cm.</i>		<i>no.</i>	<i>cm.</i>	<i>cm.</i>	
Birth	220	78.7	....	1.00	58	72.2	....	1.00	25	74.8	....	1.00	95	67.9	....	1.00
1	185	82.2	3.5	1.04	42	76.5	4.3	1.06	19	76.8	2.0	1.03	79	71.1	3.2	1.05
2	157	86.3	4.1	1.10	29	78.6	2.1	1.09	17	80.3	3.5	1.07	65	74.7	3.6	1.10
3	144	91.3	5.0	1.16	23	82.9	4.3	1.15	14	84.3	4.0	1.13	57	79.1	4.4	1.16
4	128	96.6	5.3	1.23	16	87.6	4.7	1.21	10	89.1	4.8	1.19	51	83.7	4.6	1.23
5	116	101.6	5.0	1.29	12	91.6	4.0	1.27	9	94.1	5.0	1.26	41	87.9	4.2	1.29
6	104	106.4	4.8	1.35	12	95.3	3.7	1.32	8	98.3	4.2	1.31	31	91.9	4.0	1.35
7	87	110.7	4.3	1.41	10	98.6	3.3	1.37	6	104.7	6.4	1.40	23	95.8	3.9	1.41
8	76	114.4	3.7	1.45	6	102.0	3.5	1.41	3	109.7	5.0	1.47	13	99.6	3.8	1.47
9	65	117.9	3.5	1.50	4	105.6	3.6	1.46	....	....	....	....	8	103.4	3.8	1.52
10	46	120.8	2.9	1.53	4	109.7	4.1	1.52	....	....	....	....	5	107.7	4.3	1.59
11	40	123.2	2.4	1.57	3	112.5	2.8	1.56	....	....	....	....	3	113.8	6.1	1.68
12	25	125.4	2.2	1.59	3	114.7	2.2	1.59	....	....	....	....	1	115.0	1.2	1.69
13	17	127.4	2.0	1.62	1	117.4	2.7	1.63	....	....	....	....	....	....	....	....
14	10	129.6	2.2	1.65	1	120.8	3.4	1.67	....	....	....	....	....	....	....	....
15	9	131.4	1.8	1.67	1	123.5	4.7	1.74	....	....	....	....	....	....	....	....
16	7	133.3	1.9	1.69	1	127.5	2.0	1.77	....	....	....	....	....	....	....	....
17	5	134.7	1.4	1.71	....	....	....	....	....	....	....	....	....	....	....	....
18	4	136.2	1.5	1.73	....	....	....	....	....	....	....	....	....	....	....	....
19	3	137.7	1.5	1.75	....	....	....	....	....	....	....	....	....	....	....	....
20	3	139.0	1.3	1.77	....	....	....	....	....	....	....	....	....	....	....	....
21	3	140.2	1.2	1.78	....	....	....	....	....	....	....	....	....	....	....	....
22	3	140.7	0.5	1.79	....	....	....	....	....	....	....	....	....	....	....	....
23	3	141.5	0.8	1.80	....	....	....	....	....	....	....	....	....	....	....	....
24	2	142.5	1.0	1.81	....	....	....	....	....	....	....	....	....	....	....	....
25	1	143.2	0.7	1.82	....	....	....	....	....	....	....	....	....	....	....	....
26	1	146.5	3.3	1.86	....	....	....	....	....	....	....	....	....	....	....	....
27	1	145.0	-1.5	1.84	....	....	....	....	....	....	....	....	....	....	....	....
Total gain 6 months			27.7	....			23.1	....			23.5	....			24.0	....
Total gain 12 months			46.7	....			42.5	....			....	....			47.1	....

* Five-month moving average.

Table 4.—Monthly height at pinbones, gains in height at pinbones, and relation to birth of Holstein, Ayrshire, Guernsey and Jersey males.

Age in months	HOLSTEIN				AYRSHIRE				GUERNSEY				JERSEY			
	Animals	Height at pinbones (av. *)	Gain monthly	Relation to birth	Animals	Height at pinbones (av. *)	Gain monthly	Relation to birth	Animals	Height at pinbones (av. *)	Gain monthly	Relation to birth	Animals	Height at pinbones (av. *)	Gain monthly	Relation to birth
Birth	no.	cm.	cm.		no.	cm.	cm.		no.	cm.	cm.		no.	cm.	cm.	
1	137	76.1	....	1.00	43	69.5	....	1.00	14	71.5	....	1.00	51	64.5	....	1.00
2	104	80.8	4.7	1.06	27	74.5	5.0	1.07	8	74.9	3.4	1.05	36	68.9	4.4	1.07
3	82	84.8	4.0	1.11	20	76.2	1.7	1.10	8	78.9	4.0	1.10	34	73.0	4.1	1.13
4	75	90.8	6.0	1.19	16	81.1	4.9	1.17	9	84.2	5.3	1.18	30	78.3	5.3	1.21
5	65	96.6	5.8	1.27	12	85.6	4.5	1.23	5	89.0	4.8	1.24	31	82.7	4.4	1.28
6	60	101.6	5.0	1.34	9	89.3	3.7	1.28	5	93.2	4.2	1.30	26	86.3	3.6	1.34
7	54	106.1	4.5	1.39	9	91.2	1.9	1.31	5	97.2	4.0	1.36	21	89.6	3.3	1.39
8	43	110.0	3.9	1.45	7	94.3	3.1	1.36	4	102.6	5.4	1.43	15	92.7	3.1	1.44
9	37	113.4	3.4	1.49	3	97.3	3.0	1.40	1	104.5	1.9	1.46	7	95.8	3.1	1.49
10	33	116.6	3.2	1.53	3	100.0	2.7	1.44	....	....	....	....	4	99.3	3.5	1.54
11	24	118.9	2.3	1.56	3	106.1	6.1	1.53	....	....	....	....	2	105.0	5.7	1.63
12	21	120.8	1.9	1.59	2	108.9	2.8	1.57	....	....	....	....	2	110.0	5.0	1.71
13	11	122.7	1.6	1.61	2	111.4	2.5	1.60	....	....	....	....	1	112.5	2.5	1.74
14	6	124.3	1.6	1.63	1	115.3	3.9	1.66	....	....	....	....	....	....	....	....
15	5	126.5	2.2	1.66	1	119.2	3.9	1.72	....	....	....	....	....	....	....	....
16	5	127.9	1.4	1.68	1	123.0	3.8	1.77	....	....	....	....	....	....	....	....
17	5	129.2	1.3	1.70	1	124.0	1.0	1.78	....	....	....	....	....	....	....	....
18	4	130.1	0.9	1.71	....	....	....	....	....	....	....	....	....	....	....	....
19	3	131.3	1.2	1.73	....	....	....	....	....	....	....	....	....	....	....	....
20	3	132.8	1.5	1.75	....	....	....	....	....	....	....	....	....	....	....	....
21	3	134.1	1.3	1.76	....	....	....	....	....	....	....	....	....	....	....	....
22	3	134.8	0.7	1.77	....	....	....	....	....	....	....	....	....	....	....	....
23	3	135.1	0.3	1.78	....	....	....	....	....	....	....	....	....	....	....	....
24	3	135.3	0.2	1.78	....	....	....	....	....	....	....	....	....	....	....	....
25	2	135.5	0.2	1.78	....	....	....	....	....	....	....	....	....	....	....	....
26	1	135.1	-0.4	1.78	....	....	....	....	....	....	....	....	....	....	....	....
27	1	137.0	1.9	1.80	....	....	....	....	....	....	....	....	....	....	....	....
27	1	135.5	-1.5	1.78	....	....	....	....	....	....	....	....	....	....	....	....
Total gain 6 months			30.0	....	....		21.7	....	....		25.7	....	....		25.1	....
Total gain 12 months			46.6	....	....		41.9	....	....			....	....		48.0	....

* Five-month moving average.

Table 5.—Monthly diagonal lengths, gains in diagonal length and relation to birth of Holstein, Ayrshire, Guernsey and Jersey males.

Age in months	HOLSTEIN				AYRSHIRE				GUERNSEY				JERSEY			
	Animals	Diagonal length (av. *)	Gain monthly	Relation to birth	Animals	Diagonal length (av. *)	Gain monthly	Relation to birth	Animals	Diagonal length (av. *)	Gain monthly	Relation to birth	Animals	Diagonal length (av. *)	Gain monthly	Relation to birth
Birth	<i>no.</i>	<i>cm.</i>	<i>cm.</i>		<i>no.</i>	<i>cm.</i>	<i>cm.</i>		<i>no.</i>	<i>cm.</i>	<i>cm.</i>		<i>no.</i>	<i>cm.</i>	<i>cm.</i>	
1	136	72.1	....	1.00	43	67.3	....	1.00	14	67.7	....	1.00	51	62.3	....	1.00
2	104	78.3	6.2	1.09	27	73.6	6.3	1.09	8	73.3	5.6	1.08	36	67.4	5.1	1.08
3	82	84.2	5.9	1.17	20	76.3	2.7	1.03	8	78.6	5.3	1.16	34	73.8	6.4	1.18
4	75	92.7	8.5	1.29	16	82.9	6.6	1.23	9	86.3	7.7	1.27	30	81.2	7.4	1.30
5	65	101.1	8.4	1.40	12	89.4	6.5	1.33	5	93.3	7.0	1.38	31	87.6	6.4	1.41
6	60	108.4	7.3	1.50	9	95.2	5.8	1.41	5	99.4	6.1	1.47	26	93.4	5.8	1.50
7	54	115.1	6.7	1.60	9	99.7	4.5	1.48	5	105.4	6.0	1.56	21	98.2	4.8	1.58
8	43	121.0	5.9	1.68	7	104.5	4.8	1.55	4	112.1	6.7	1.66	15	103.1	4.9	1.65
9	37	126.2	5.1	1.75	3	110.3	5.8	1.64	1	123.0	10.9	1.82	7	108.2	5.1	1.74
10	33	131.1	4.9	1.82	3	115.7	5.4	1.72	....	....	....	....	4	114.4	6.2	1.84
11	24	135.0	3.9	1.87	3	122.2	6.5	1.82	....	....	....	....	2	122.0	7.6	1.96
12	21	138.3	3.3	1.92	3	125.6	3.4	1.87	....	....	....	....	2	131.0	9.0	2.10
13	11	141.5	3.2	1.96	2	129.2	3.6	1.92	....	....	....	....	1	126.5	4.5	2.03
14	6	144.7	3.2	2.01	1	133.7	4.5	1.99	....	....	....	....	....	....	....	....
15	5	148.2	3.5	2.06	1	138.8	5.1	2.06	....	....	....	....	....	....	....	....
16	5	150.7	2.5	2.09	1	147.0	8.2	2.18	....	....	....	....	....	....	....	....
17	5	153.1	2.4	2.12	1	145.0	-2.0	2.15	....	....	....	....	....	....	....	....
18	4	154.9	1.8	2.15	....	....	....	....	....	....	....	....	....	....	....	....
19	3	157.6	2.7	2.19	....	....	....	....	....	....	....	....	....	....	....	....
20	3	160.5	2.9	2.23	....	....	....	....	....	....	....	....	....	....	....	....
21	3	162.1	1.6	2.25	....	....	....	....	....	....	....	....	....	....	....	....
22	3	163.6	1.5	2.27	....	....	....	....	....	....	....	....	....	....	....	....
23	3	164.1	0.5	2.28	....	....	....	....	....	....	....	....	....	....	....	....
24	3	164.9	0.8	2.29	....	....	....	....	....	....	....	....	....	....	....	....
25	2	165.6	0.7	2.30	....	....	....	....	....	....	....	....	....	....	....	....
26	1	166.9	1.3	2.31	....	....	....	....	....	....	....	....	....	....	....	....
27	1	171.5	4.6	2.38	....	....	....	....	....	....	....	....	....	....	....	....
	1	170.0	-1.5	2.36	....	....	....	....	....	....	....	....	....	....	....	....
Total gain 6 months			43.0	....	....		32.4	....	....		37.7	....	....		35.9	....
Total gain 12 months			69.4	....	....		61.9	....	....		...	....	....		64.2	....

* Five-month moving average.

Table 6.—Monthly body lengths, gains in body length, and relation to birth of Holstein, Ayrshire, Guernsey and Jersey males.

Age in months	HOLSTEIN				AYRSHIRE				GUERNSEY				JERSEY			
	Animals	Length body (av.*)	Gain monthly	Relation to birth	Animals	Length body (av.*)	Gain monthly	Relation to birth	Animals	Length body (av.*)	Gain monthly	Relation to birth	Animals	Length body (av.*)	Gain monthly	Relation to birth
	<i>no.</i>	<i>cm.</i>	<i>cm.</i>		<i>no.</i>	<i>cm.</i>	<i>cm.</i>		<i>no.</i>	<i>cm.</i>	<i>cm.</i>		<i>no.</i>	<i>cm.</i>	<i>cm.</i>	
Birth	136	61.2	....	1.00	43	56.1	....	1.00	14	56.9	....	1.00	51	52.2	....	1.00
1	104	66.3	5.1	1.08	27	62.0	5.9	1.11	8	60.2	3.3	1.06	36	56.9	4.7	1.09
2	82	71.6	5.3	1.17	20	64.1	2.1	1.14	8	71.0	10.8	1.25	34	62.3	5.4	1.19
3	75	78.9	7.3	1.29	16	70.2	6.1	1.25	9	78.6	7.6	1.38	30	68.7	5.4	1.32
4	65	86.3	7.4	1.41	12	76.0	5.8	1.35	5	85.0	6.4	1.49	31	74.3	5.6	1.42
5	60	92.4	6.1	1.51	9	81.2	5.2	1.45	5	90.0	5.0	1.58	26	79.6	5.3	1.52
6	54	98.2	5.8	1.60	9	85.6	4.2	1.53	5	92.2	2.2	1.62	21	84.0	4.4	1.61
7	43	103.7	5.5	1.69	7	89.9	4.3	1.60	4	94.0	1.8	1.65	15	88.2	4.2	1.69
8	37	108.2	4.5	1.77	3	94.4	4.5	1.68	1	100.0	6.0	1.76	7	92.5	4.3	1.77
9	33	112.3	4.1	1.83	3	99.2	4.8	1.77	....	....	....	....	4	98.4	5.9	1.89
10	24	115.6	3.3	1.89	3	105.0	5.8	1.87	....	....	....	....	2	105.2	6.8	2.02
11	21	118.3	2.7	1.93	2	108.0	3.0	1.93	....	....	....	....	2	114.5	9.3	2.19
12	11	121.1	2.8	1.98	2	111.1	3.1	1.98	....	....	....	....	1	113.5	-1.0	2.16
13	6	123.9	2.8	2.02	1	115.1	4.0	2.05	....	....	....	....	....	....	....	....
14	5	126.9	3.0	2.07	1	119.4	4.3	2.13	....	....	....	....	....	....	....	....
15	5	129.0	2.1	2.11	1	123.0	3.6	2.19	....	....	....	....	....	....	....	....
16	5	131.0	2.0	2.14	1	129.0	6.0	2.30	....	....	....	....	....	....	....	....
17	4	133.7	2.7	2.18	....	....	....	....	....	....	....	....	....	....	....	....
18	3	135.9	2.2	2.22	....	....	....	....	....	....	....	....	....	....	....	....
19	3	138.4	2.5	2.26	....	....	....	....	....	....	....	....	....	....	....	....
20	3	140.0	1.6	2.29	....	....	....	....	....	....	....	....	....	....	....	....
21	3	141.5	1.5	2.31	....	....	....	....	....	....	....	....	....	....	....	....
22	3	142.0	0.5	2.32	....	....	....	....	....	....	....	....	....	....	....	....
23	3	143.5	0.5	2.34	....	....	....	....	....	....	....	....	....	....	....	....
24	2	143.8	0.3	2.35	....	....	....	....	....	....	....	....	....	....	....	....
25	1	145.3	1.5	2.37	....	....	....	....	....	....	....	....	....	....	....	....
26	1	146.5	1.2	2.39	....	....	....	....	....	....	....	....	....	....	....	....
27	1	147.0	0.5	2.40	....	....	....	....	....	....	....	....	....	....	....	....
Total gain 6 months			37.0	....	....		29.5	....	....		35.3	....	....		31.8	....
Total gain 12 months			59.9	....	....		55.0	....	....			....	....		61.3	....

* Five-month moving average.

Table 7.—Monthly rump lengths, gains in rump length and relation to birth of Holstein, Ayrshire, Guernsey and Jersey males.

Age in months	HOLSTEIN				AYRSHIRE				GUERNSEY				JERSEY			
	Animals	Rump length (av. *)	Gain monthly	Relation to birth	Animals	Rump length (av. *)	Gain monthly	Relation to birth	Animals	Rump length (av. *)	Gain monthly	Relation to birth	Animals	Rump length (av. *)	Gain monthly	Relation to birth
	<i>no.</i>	<i>cm.</i>	<i>cm.</i>		<i>no.</i>	<i>cm.</i>	<i>cm.</i>		<i>no.</i>	<i>cm.</i>	<i>cm.</i>		<i>no.</i>	<i>cm.</i>	<i>cm.</i>	
Birth	136	21.2	....	1.00	43	19.3	....	1.00	14	19.3	....	1.00	51	18.5	....	1.00
1	104	23.0	1.8	1.08	27	21.2	1.9	1.10	8	20.7	1.4	1.07	36	19.9	1.4	1.08
2	82	24.5	1.5	1.16	20	21.9	0.7	1.13	8	22.2	1.5	1.15	34	21.4	1.5	1.16
3	75	26.8	2.3	1.26	16	23.8	1.9	1.23	9	24.2	2.0	1.25	30	23.4	2.0	1.26
4	65	29.2	2.4	1.38	12	25.6	1.8	1.33	5	26.0	1.8	1.35	31	25.1	1.7	1.36
5	60	31.4	2.2	1.48	9	27.2	1.6	1.41	5	27.6	1.6	1.43	26	26.8	1.7	1.45
6	54	33.4	2.0	1.58	9	28.4	1.2	1.47	5	28.9	1.3	1.50	21	28.2	1.4	1.52
7	43	35.3	1.9	1.67	7	29.8	1.4	1.54	4	30.9	2.0	1.60	15	29.7	1.5	1.61
8	37	36.9	1.6	1.74	3	31.7	1.9	1.64	1	35.0	4.1	1.81	7	31.2	1.5	1.69
9	33	38.5	1.6	1.82	3	33.4	1.7	1.73	.....	.....	.....	.....	4	33.1	1.9	1.79
10	24	39.7	1.2	1.87	3	35.7	2.3	1.85	.....	.....	.....	.....	2	36.1	3.0	1.95
11	21	40.6	0.9	1.92	2	37.0	1.3	1.92	.....	.....	.....	.....	2	38.5	2.4	2.08
12	11	41.4	0.8	1.95	2	38.6	1.6	2.00	.....	.....	.....	.....	1	38.5	0.0	2.08
13	6	42.1	0.7	1.99	1	39.6	1.0	2.05	.....	.....	.....	.....	.....	.....	.....	.....
14	5	42.7	0.6	2.01	1	41.2	1.6	2.13	.....	.....	.....	.....	.....	.....	.....	.....
15	5	43.5	0.8	2.05	1	44.0	2.8	2.28	.....	.....	.....	.....	.....	.....	.....	.....
16	5	44.5	1.0	2.10	1	44.5	0.5	2.31	.....	.....	.....	.....	.....	.....	.....	.....
17	4	45.4	0.9	2.14	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
18	3	46.1	0.7	2.17	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
19	3	47.3	1.2	2.23	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
20	3	47.7	0.4	2.25	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
21	3	47.8	0.1	2.25	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
22	3	47.6	-0.2	2.25	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
23	3	47.8	0.2	2.25	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
24	2	47.7	-0.1	2.25	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
25	1	47.9	0.2	2.26	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
26	1	51.0	3.1	2.41	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
27	1	48.0	-3.0	2.26	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Total gain 6 months			12.2	.....	.....		9.1	.....	.....		9.6	.....	.....		9.7	.....
Total gain 12 months			20.2	.....	.....		19.3	.....	.....			.....	.....		20.0	.....

* Five-month moving average.

Table 8.—Monthly chest widths, gains in chest width, and relation to birth of Holstein, Ayrshire, Guernsey and Jersey males.

Age in months	HOLSTEIN				AYRSHIRE				GUERNSEY				JERSEY			
	Animals	Chest width (av.)*	Gain monthly	Relation to birth	Animals	Chest width (av.)*	Gain monthly	Relation to birth	Animals	Chest width (av.)*	Gain monthly	Relation to birth	Animals	Chest width (av.)*	Gain monthly	Relation to birth
	no.	cm.	cm.		no.	cm.	cm.		no.	cm.	cm.		no.	cm.	cm.	
Birth	220	18.2	....	1.00	58	16.6	....	1.00	25	15.8	....	1.00	95	13.7	....	1.00
1	185	19.4	1.2	1.07	41	17.8	1.2	1.07	19	16.2	0.4	1.03	79	14.3	0.6	1.04
2	157	20.9	1.5	1.15	29	18.5	0.7	1.11	17	17.2	1.0	1.09	65	15.3	1.0	1.12
3	144	22.9	2.0	1.26	23	19.9	1.4	1.20	14	18.6	1.4	1.18	57	16.6	1.3	1.21
4	128	25.1	2.2	1.38	16	21.7	1.8	1.31	10	20.4	1.8	1.29	51	18.1	1.5	1.32
5	116	27.3	2.2	1.50	12	23.5	1.8	1.42	9	22.3	1.9	1.41	41	19.6	1.5	1.43
6	104	29.6	2.3	1.63	12	25.2	1.7	1.52	8	24.2	1.9	1.53	31	21.3	1.7	1.55
7	87	31.7	2.1	1.74	10	26.7	1.5	1.61	6	26.9	2.7	1.70	23	23.1	1.8	1.69
8	76	33.7	2.0	1.85	6	28.4	1.7	1.71	3	29.7	2.8	1.88	13	24.8	1.7	1.81
9	65	35.7	2.0	1.96	4	30.2	1.8	1.82	....	....	....	....	8	26.6	1.8	1.94
10	46	37.3	1.6	2.05	4	32.0	1.8	1.93	....	....	....	....	5	28.7	2.1	2.09
11	40	38.8	1.5	2.13	3	33.4	1.4	2.01	....	....	....	....	3	31.8	3.1	2.32
12	25	40.1	1.3	2.20	3	34.5	1.1	2.08	....	....	....	....	1	31.5	-0.3	2.30
13	17	41.2	1.1	2.26	1	35.4	0.9	2.13	....	....	....	....	....	....	....	....
14	10	42.2	1.0	2.32	1	36.4	1.0	2.19	....	....	....	....	....	....	....	....
15	9	43.2	1.0	2.37	1	38.7	1.3	2.33	....	....	....	....	....	....	....	....
16	7	44.4	1.2	2.44	1	38.0	-0.7	2.29	....	....	....	....	....	....	....	....
17	5	45.8	1.4	2.52	....	....	....	....	....	....	....	....	....	....	....	....
18	4	47.0	1.2	2.58	....	....	....	....	....	....	....	....	....	....	....	....
19	3	48.3	1.3	2.65	....	....	....	....	....	....	....	....	....	....	....	....
20	3	49.2	0.9	2.70	....	....	....	....	....	....	....	....	....	....	....	....
21	3	49.6	0.4	2.72	....	....	....	....	....	....	....	....	....	....	....	....
22	3	49.7	0.1	2.73	....	....	....	....	....	....	....	....	....	....	....	....
23	3	50.1	0.4	2.75	....	....	....	....	....	....	....	....	....	....	....	....
24	2	50.5	0.4	2.77	....	....	....	....	....	....	....	....	....	....	....	....
25	1	50.7	0.2	2.79	....	....	....	....	....	....	....	....	....	....	....	....
26	1	52.5	1.8	2.88	....	....	....	....	....	....	....	....	....	....	....	....
Total gain 6 months			11.4	....	....		8.6	....	....		8.4	....	....		7.6	....
Total gains 12 months			21.9	....	....		17.9	....	....			....	....		17.8	....

* Five-month moving average.

Table 9.—Monthly widths at hooks, gains in width at hooks, and relation to birth of Holstein, Ayrshire, Guernsey and Jersey males.

Age in months	HOLSTEIN				AYRSHIRE				GUERNSEY				JERSEY			
	Animals	Hook width (av. *)	Gain monthly	Relation to birth	Animals	Hook width (av. *)	Gain monthly	Relation to birth	Animals	Hook width (av. *)	Gain monthly	Relation to birth	Animals	Hook width (av. *)	Gain monthly	Relation to birth
Birth	<i>no.</i>	<i>cm.</i>	<i>cm.</i>		<i>no.</i>	<i>cm.</i>	<i>cm.</i>		<i>no.</i>	<i>cm.</i>	<i>cm.</i>		<i>no.</i>	<i>cm.</i>	<i>cm.</i>	
1	212	17.1	....	1.00	58	16.0	....	1.00	25	15.3	....	1.00	92	13.9	....	1.00
2	178	18.5	1.4	1.08	42	17.5	1.5	1.09	19	16.3	1.0	1.07	79	15.2	1.3	1.09
3	150	20.6	2.1	1.20	29	18.7	1.2	1.17	17	17.8	1.5	1.16	65	17.1	1.9	1.23
4	137	22.8	2.2	1.33	23	20.7	2.0	1.29	14	19.7	1.9	1.29	57	19.0	1.9	1.37
5	121	25.4	2.6	1.49	16	23.1	2.4	1.44	10	22.0	2.3	1.44	51	21.1	2.1	1.52
6	109	27.7	2.3	1.62	12	25.3	2.2	1.58	9	24.2	2.2	1.58	41	23.1	2.0	1.66
7	97	30.0	2.3	1.75	12	27.1	1.8	1.69	8	26.0	1.8	1.70	31	25.0	1.9	1.80
8	80	32.0	2.0	1.87	10	28.9	1.8	1.81	6	28.5	2.5	1.86	23	26.9	1.9	1.94
9	71	33.8	1.8	1.98	6	30.7	1.8	1.92	3	30.7	2.2	2.01	13	28.8	1.9	2.07
10	60	35.6	1.8	2.08	4	32.6	1.9	2.04	....	....	....	....	8	30.8	2.0	2.22
11	43	37.1	1.5	2.17	4	34.9	2.3	2.18	....	....	....	....	5	33.1	2.3	2.38
12	37	38.5	1.4	2.25	3	36.8	1.9	2.30	....	....	....	....	3	37.2	4.1	2.68
13	22	39.8	1.3	2.33	3	37.9	1.1	2.37	....	....	....	....	1	37.5	0.3	2.70
14	16	41.0	1.2	2.40	1	39.1	1.2	2.44	....	....	....	....	....	....	....	....
15	10	42.3	1.3	2.47	1	40.2	1.1	2.51	....	....	....	....	....	....	....	....
16	9	43.5	1.2	2.54	1	41.5	1.3	2.59	....	....	....	....	....	....	....	....
17	7	44.7	1.2	2.61	1	42.0	0.5	2.62	....	....	....	....	....	....	....	....
18	5	45.9	1.2	2.68	....	....	....	....	....	....	....	....	....	....	....	....
19	4	47.2	1.3	2.76	....	....	....	....	....	....	....	....	....	....	....	....
20	3	48.3	1.1	2.82	....	....	....	....	....	....	....	....	....	....	....	....
21	3	49.2	0.9	2.88	....	....	....	....	....	....	....	....	....	....	....	....
22	3	50.1	0.9	2.93	....	....	....	....	....	....	....	....	....	....	....	....
23	3	50.6	0.5	2.96	....	....	....	....	....	....	....	....	....	....	....	....
24	3	50.9	0.3	2.98	....	....	....	....	....	....	....	....	....	....	....	....
25	2	51.2	0.3	2.99	....	....	....	....	....	....	....	....	....	....	....	....
26	1	51.5	0.3	3.01	....	....	....	....	....	....	....	....	....	....	....	....
27	1	52.0	0.5	3.04	....	....	....	....	....	....	....	....	....	....	....	....
	1	52.0	0.0	3.04	....	....	....	....	....	....	....	....	....	....	....	....
Total gain 6 months		12.9	....	....		....	11.1	....		....	10.7	....		....	11.1	....
Total gain 12 months		22.7	....	....		....	21.9	....		....	....	....		....	23.6	....

* Five-month moving average.

Table 10.—Monthly width at pinbones, gains in pinbone width, and relation to birth of Holstein, Ayrshire, Guernsey and Jersey males.

Age in months	HOLSTEIN				AYRSHIRE				GUERNSEY				JERSEY			
	Animals	Pinbone width (av. *)	Gain monthly	Relation to birth	Animals	Pinbone width (av. *)	Gain monthly	Relation to birth	Animals	Pinbone width (av. *)	Gain monthly	Relation to birth	Animals	Pinbone width (av. *)	Gain monthly	Relation to birth
	<i>no.</i>	<i>cm.</i>	<i>cm.</i>		<i>no.</i>	<i>cm.</i>	<i>cm.</i>		<i>no.</i>	<i>cm.</i>	<i>cm.</i>		<i>no.</i>	<i>cm.</i>	<i>cm.</i>	
Birth	193	12.0	....	1.00	57	10.7	....	1.00	24	9.9	....	1.00	83	8.6	....	1.00
1	159	13.0	1.0	1.08	41	11.5	0.8	1.07	18	10.1	0.2	1.02	70	9.1	0.5	1.06
2	132	14.1	1.1	1.17	28	12.2	0.7	1.14	16	11.3	1.2	1.14	57	10.1	1.0	1.17
3	120	15.6	1.5	1.30	22	13.3	1.1	1.24	13	12.4	1.1	1.25	50	11.1	1.0	1.29
4	104	17.2	1.6	1.43	15	14.7	1.4	1.37	9	13.6	1.2	1.37	45	12.2	1.1	1.42
5	93	18.7	1.5	1.56	11	16.0	1.3	1.50	8	15.0	1.4	1.52	35	13.3	1.1	1.55
6	81	20.2	1.5	1.68	11	17.2	1.2	1.61	7	16.1	1.1	1.63	26	14.4	1.1	1.67
7	64	21.7	1.5	1.81	10	18.3	1.1	1.71	6	17.7	1.6	1.79	18	15.5	1.1	1.80
8	55	23.1	1.4	1.92	6	19.4	1.1	1.81	3	18.8	1.1	1.90	8	16.7	1.2	1.94
9	45	24.4	1.3	2.03	4	20.5	1.1	1.92	.....	.....	.....	.....	5	18.1	1.4	2.10
10	31	25.5	1.1	2.12	4	21.8	1.3	2.04	.....	.....	.....	.....	3	20.0	1.9	2.33
11	26	26.6	1.1	2.22	3	22.7	0.9	2.12	.....	.....	.....	.....	3	21.7	1.7	2.52
12	13	27.7	1.1	2.31	3	23.4	0.7	2.19	.....	.....	.....	.....	1	22.0	0.3	2.56
13	8	28.7	1.0	2.39	1	24.1	0.7	2.25	.....	.....	.....	.....	.....	.....	.....	.....
14	7	29.7	1.0	2.47	1	25.0	0.9	2.34	.....	.....	.....	.....	.....	.....	.....	.....
15	7	30.5	0.8	2.54	1	27.0	2.0	2.52	.....	.....	.....	.....	.....	.....	.....	.....
16	6	31.4	0.9	2.62	1	27.0	0.0	2.52	.....	.....	.....	.....	.....	.....	.....	.....
17	4	31.9	0.5	2.66	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
18	3	32.9	1.0	2.74	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
19	3	34.0	1.1	2.83	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
20	3	34.7	0.7	2.89	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
21	3	35.2	0.5	2.93	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
22	3	35.5	0.3	2.96	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
23	3	35.7	0.2	2.97	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
24	2	35.9	0.2	2.99	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
25	1	36.2	0.3	3.02	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
26	1	37.5	1.3	3.12	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
27	1	37.0	-0.5	3.08	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Total gain 6 months			8.2	.....	.....		6.5	.....	.....		6.2	.....	.....		5.8	.....
Total gain 12 months			15.7	.....	.....		12.7	.....	.....			.....	.....		13.4	.....

* Five-month moving average.

Table 11.—Monthly chest depths, gains in chest depth, and relation to birth of Holstein, Ayrshire, Guernsey and Jersey males.

Age in months	HOLSTEIN				AYRSHIRE				GUERNSEY				JERSEY			
	Animals	Chest depth (av.*)	Gain monthly	Relation to birth	Animals	Chest depth (av.*)	Gain monthly	Relation to birth	Animals	Chest depth (av.*)	Gain monthly	Relation to birth	Animals	Chest depth (av.*)	Gain monthly	Relation to birth
Birth	<i>no.</i>	<i>cm.</i>	<i>cm.</i>		<i>no.</i>	<i>cm.</i>	<i>cm.</i>		<i>no.</i>	<i>cm.</i>	<i>cm.</i>		<i>no.</i>	<i>cm.</i>	<i>cm.</i>	
1	192	29.5	.....	1.00	57	27.4	.....	1.00	24	27.6	.....	1.00	83	24.7	.....	1.00
2	158	31.9	2.4	1.08	41	30.1	2.7	1.10	18	27.7	0.1	1.00	70	27.1	2.4	1.10
3	131	34.7	2.8	1.18	27	31.4	1.3	1.15	16	31.6	3.9	1.14	57	29.8	2.7	1.21
4	119	38.0	3.3	1.29	22	34.4	3.0	1.26	13	34.5	2.9	1.25	50	32.9	3.1	1.33
5	104	41.5	3.5	1.41	15	37.7	3.3	1.38	9	37.8	3.3	1.37	45	36.1	3.2	1.46
6	94	44.6	3.1	1.51	11	40.5	2.8	1.48	8	41.1	3.3	1.49	35	38.7	2.6	1.57
7	82	47.5	2.9	1.61	11	43.1	2.6	1.57	7	43.8	2.7	1.59	25	41.2	2.5	1.67
8	65	50.2	2.7	1.70	9	45.6	2.5	1.66	6	47.9	4.1	1.74	17	43.8	2.6	1.77
9	56	52.6	2.4	1.78	5	48.0	2.4	1.75	3	50.2	2.3	1.82	8	46.4	2.6	1.88
10	46	55.0	2.4	1.86	4	50.5	2.5	1.84	.....	.....	.....	.....	5	49.5	3.1	2.00
11	31	57.0	2.0	1.93	4	53.4	2.9	1.95	.....	.....	.....	.....	3	53.2	3.7	2.15
12	27	58.8	1.8	1.99	3	55.0	1.6	2.01	.....	.....	.....	.....	3	60.2	7.0	2.44
13	14	60.7	1.9	2.06	3	56.6	1.6	2.07	.....	.....	.....	.....	3	57.0	-3.2	2.31
14	9	62.6	1.9	2.12	1	58.7	2.1	2.14	.....	.....	.....	.....	.....	.....	.....	.....
15	8	64.6	2.0	2.19	1	60.4	1.7	2.20	.....	.....	.....	.....	.....	.....	.....	.....
16	8	66.2	1.6	2.24	1	64.0	3.6	2.34	.....	.....	.....	.....	.....	.....	.....	.....
17	6	67.7	1.5	2.29	1	64.5	0.5	2.35	.....	.....	.....	.....	.....	.....	.....	.....
18	4	69.4	1.7	2.35	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
19	3	71.2	1.8	2.41	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
20	3	72.5	1.3	2.46	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
21	3	73.5	1.0	2.49	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
22	3	74.2	0.7	2.52	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
23	3	74.8	0.6	2.54	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
24	3	75.4	0.6	2.56	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
25	2	76.2	0.8	2.58	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
26	1	77.0	0.8	2.61	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
27	1	78.0	1.0	2.64	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	1	78.0	0.0	2.64	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Total gain 6 months			18.0	.....	.....		15.7	.....	.....		16.2	.....	.....		16.5	.....
Total gain 12 months			31.2	.....	.....		29.2	.....	.....			.....	.....		32.3	.....

* Five-month moving average.

Table 12.—Monthly barrel depths, gains in barrel depth, and relation to birth of Holstein, Ayrshire, Guernsey and Jersey males.

Age in months	HOLSTEIN				AYRSHIRE				GUERNSEY				JERSEY			
	Animals	Barrel depth (av.*)	Gain monthly	Relation to birth	Animals	Barrel depth (av.*)	Gain monthly	Relation to birth	Animals	Barrel depth (av.*)	Gain monthly	Relation to birth	Animals	Barrel depth (av.*)	Gain monthly	Relation to birth
Birth	<i>no.</i>	<i>cm.</i>	<i>cm.</i>		<i>no.</i>	<i>cm.</i>	<i>cm.</i>		<i>no.</i>	<i>cm.</i>	<i>cm.</i>		<i>no.</i>	<i>cm.</i>	<i>cm.</i>	
1	220	28.7	....	1.00	58	27.4	....	1.00	25	27.0	....	1.00	95	24.3	....	1.00
2	185	31.3	2.6	1.09	42	30.6	3.2	1.12	19	28.8	1.8	1.07	79	26.6	2.3	1.09
3	157	35.2	3.9	1.23	29	32.7	2.1	1.19	17	32.2	3.4	1.19	65	30.3	3.7	1.25
4	144	39.4	4.2	1.37	23	36.6	3.9	1.34	14	35.8	3.6	1.33	57	34.1	3.8	1.40
5	128	43.7	4.3	1.52	16	40.9	4.3	1.49	10	40.1	4.3	1.49	51	38.2	4.1	1.57
6	116	47.6	3.9	1.66	12	44.5	3.6	1.62	9	44.1	4.0	1.63	41	41.9	3.7	1.72
7	104	51.0	3.4	1.78	12	47.8	3.3	1.74	8	47.3	3.2	1.75	31	45.0	3.1	1.85
8	87	54.0	3.0	1.88	10	50.3	2.5	1.84	6	52.8	5.5	1.96	23	47.8	2.8	1.97
9	76	56.5	2.5	1.97	6	52.6	2.3	1.92	3	53.8	1.0	1.99	13	50.4	2.6	2.07
10	65	58.8	2.3	2.05	4	55.2	2.6	2.01	....	....	....	....	8	52.9	2.5	2.18
11	46	60.8	2.0	2.12	4	57.6	2.4	2.10	....	....	....	....	5	55.0	2.1	2.26
12	40	62.5	1.7	2.18	3	58.8	1.2	2.15	....	....	....	....	3	60.2	5.2	2.48
13	25	63.9	1.4	2.23	3	60.1	1.3	2.19	....	....	....	....	1	58.0	-2.2	2.39
14	17	65.4	1.5	2.28	1	61.6	1.5	2.25	....	....	....	....	....	....	....	....
15	10	66.5	1.1	2.32	1	62.7	1.1	2.29	....	....	....	....	....	....	....	....
16	9	67.8	1.3	2.36	1	65.0	2.3	2.37	....	....	....	....	....	....	....	....
17	7	69.4	1.6	2.42	1	66.5	1.5	2.43	....	....	....	....	....	....	....	....
18	5	70.4	1.0	2.45	....	....	....	....	....	....	....	....	....	....	....	....
19	4	71.2	0.8	2.48	....	....	....	....	....	....	....	....	....	....	....	....
20	3	72.2	1.0	2.52	....	....	....	....	....	....	....	....	....	....	....	....
21	3	73.1	0.9	2.55	....	....	....	....	....	....	....	....	....	....	....	....
22	3	73.6	0.5	2.56	....	....	....	....	....	....	....	....	....	....	....	....
23	3	73.4	-0.2	2.56	....	....	....	....	....	....	....	....	....	....	....	....
24	3	73.9	0.5	2.57	....	....	....	....	....	....	....	....	....	....	....	....
25	3	74.4	0.5	2.59	....	....	....	....	....	....	....	....	....	....	....	....
26	1	74.6	0.2	2.60	....	....	....	....	....	....	....	....	....	....	....	....
27	1	77.0	2.4	2.68	....	....	....	....	....	....	....	....	....	....	....	....
	1	77.0	0.0	2.68	....	....	....	....	....	....	....	....	....	....	....	....
Total gain 6 months				22.3	....	....	20.4	....	....	....	20.3	....	....	....	20.7	....
Total gain 12 months				35.2	....	....	32.7	....	....	....	....	....	....	....	33.7	....

* Five-month moving average.

Table 13.—Monthly chest girths, gains in chest girth, and relation to birth of Holstein, Ayrshire, Guernsey and Jersey males.

Age in months	HOLSTEIN				AYRSHIRE				GUERNSEY				JERSEY			
	Animals	Chest girth (av. *)	Gain monthly	Relation to birth	Animals	Chest girth (av. *)	Gain monthly	Relation to birth	Animals	Chest girth (av. *)	Gain monthly	Relation to birth	Animals	Chest girth (av. *)	Gain monthly	Relation to birth
	no.	cm.	cm.		no.	cm.	cm.		no.	cm.	cm.		no.	cm.	cm.	
Birth	219	80.2	.....	1.00	58	75.2	.....	1.00	25	74.3	.....	1.00	95	67.3	.....	1.00
1	185	85.3	5.1	1.06	42	80.5	5.3	1.07	19	77.1	2.8	1.04	79	71.3	4.0	1.06
2	157	92.7	7.4	1.16	29	84.6	4.1	1.12	17	83.3	6.2	1.12	65	78.1	6.8	1.16
3	144	101.1	8.4	1.26	23	91.6	7.0	1.22	14	90.3	7.0	1.22	57	85.2	7.1	1.27
4	128	110.4	9.3	1.38	16	100.0	8.4	1.33	10	98.7	8.4	1.33	51	93.2	8.0	1.38
5	116	119.2	8.8	1.49	12	107.7	7.7	1.43	9	107.3	8.6	1.44	41	100.7	7.5	1.50
6	104	127.7	8.5	1.59	12	114.7	7.0	1.53	8	113.8	6.5	1.53	31	108.0	7.3	1.60
7	87	135.6	7.9	1.69	10	120.5	5.8	1.60	6	125.5	11.7	1.69	23	115.1	7.1	1.71
8	76	142.5	6.9	1.78	6	126.7	6.2	1.68	3	127.7	2.2	1.72	13	122.5	7.4	1.82
9	65	149.2	6.7	1.86	4	133.3	6.6	1.77	.....	.....	.....	.....	8	129.6	7.1	1.93
10	46	154.7	5.5	1.93	4	140.8	7.5	1.87	.....	.....	.....	.....	5	137.2	7.6	2.04
11	40	159.9	5.2	1.99	3	146.3	5.5	1.95	.....	.....	.....	.....	3	146.7	9.5	2.18
12	25	164.7	4.8	2.05	3	151.7	5.4	2.02	.....	.....	.....	.....	1	151.0	4.3	2.24
13	17	168.8	4.1	2.10	1	156.6	4.9	2.08	.....	.....	.....	.....	.....	.....	.....	.....
14	10	173.5	4.7	2.16	1	161.3	4.7	2.14	.....	.....	.....	.....	.....	.....	.....	.....
15	9	178.1	4.6	2.22	1	169.0	7.7	2.25	.....	.....	.....	.....	.....	.....	.....	.....
16	7	183.0	4.9	2.28	1	171.0	2.0	2.27	.....	.....	.....	.....	.....	.....	.....	.....
17	5	187.4	4.4	2.34	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
18	4	192.2	4.8	2.40	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
19	3	196.1	3.9	2.45	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
20	3	199.4	3.3	2.49	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
21	3	202.2	2.8	2.52	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
22	3	203.7	1.5	2.54	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
23	3	205.2	1.5	2.56	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
24	2	206.8	1.6	2.58	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
25	1	208.1	1.3	2.59	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
26	1	210.0	1.9	2.62	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
27	1	211.0	1.0	2.63	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Total gain 6 months			47.5	.....	.....		39.5	.....	.....		39.5	.....	.....		40.7	.....
Total gain 12 months			84.5	.....	.....		76.5	.....	.....			.....	.....		83.7	.....

* Five-month moving average.

Table 14.—Monthly barrel girths, gains in barrel girth and relation to birth of Holstein, Ayrshire, Guernsey and Jersey males.

Age in months	HOLSTEIN				AYRSHIRE				GUERNSEY				JERSEY			
	Animals	Barrel girth (av.*)	Gain monthly	Relation to birth	Animals	Barrel girth (av.*)	Gain monthly	Relation to birth	Animals	Barrel girth (av.*)	Gain monthly	Relation to birth	Animals	Barrel girth (av.*)	Gain monthly	Relation to birth
Birth	<i>no.</i>	<i>cm.</i>	<i>cm.</i>		<i>no.</i>	<i>cm.</i>	<i>cm.</i>		<i>no.</i>	<i>cm.</i>	<i>cm.</i>		<i>no.</i>	<i>cm.</i>	<i>cm.</i>	
1	220	81.7	8.9	1.00	58	78.8	.....	1.00	25	76.6	.....	1.00	95	70.0	.....	1.00
2	185	90.6	8.9	1.11	42	87.7	9.0	1.11	19	82.9	6.3	1.08	79	77.3	7.3	1.10
3	157	103.2	12.6	1.26	29	95.5	7.7	1.21	17	93.2	10.3	1.22	65	89.1	11.8	1.27
4	144	116.9	13.7	1.43	23	107.5	12.0	1.36	14	104.7	11.5	1.37	57	100.7	11.6	1.44
5	128	131.0	14.1	1.60	16	121.8	14.3	1.55	10	117.6	12.9	1.54	51	112.8	12.1	1.61
6	116	143.5	12.5	1.76	12	133.5	11.7	1.70	9	129.4	11.8	1.69	41	121.9	9.1	1.74
7	104	154.3	10.8	1.89	12	143.0	9.5	1.81	8	138.8	9.4	1.81	31	131.4	9.5	1.88
8	87	163.7	9.4	2.00	10	151.0	8.0	1.92	6	154.3	15.5	2.01	23	139.9	8.5	2.00
9	76	171.2	7.5	2.10	6	150.4	8.4	2.02	3	160.7	6.4	2.10	13	147.9	8.0	2.11
10	65	178.5	7.3	2.18	4	167.0	7.6	2.12	.....	.....	.....	.....	8	156.0	8.1	2.23
11	46	184.2	5.7	2.25	4	174.0	7.0	2.21	.....	.....	.....	.....	5	164.7	8.7	2.35
12	40	189.3	5.1	2.32	3	180.8	6.8	2.29	.....	.....	.....	.....	3	176.7	12.0	2.52
13	25	193.9	4.6	2.37	3	184.3	3.5	2.34	.....	.....	.....	.....	1	181.0	4.3	2.59
14	17	198.3	4.4	2.43	1	184.4	0.1	2.34	.....	.....	.....	.....	.....	.....	.....	.....
15	10	201.9	3.6	2.47	1	186.1	1.7	2.36	.....	.....	.....	.....	.....	.....	.....	.....
16	9	205.8	3.9	2.52	1	192.0	5.9	2.44	.....	.....	.....	.....	.....	.....	.....	.....
17	7	211.3	5.5	2.59	1	194.0	2.0	2.46	.....	.....	.....	.....	.....	.....	.....	.....
18	5	215.4	4.1	2.64	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
19	4	218.9	3.5	2.68	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
20	3	221.3	2.4	2.71	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
21	3	223.8	2.5	2.74	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
22	3	225.6	1.8	2.76	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
23	3	227.0	1.4	2.78	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
24	3	229.3	2.3	2.81	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
25	2	233.0	3.7	2.85	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
26	1	235.0	2.0	2.88	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
27	1	242.0	7.0	2.96	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	1	240.0	-2.0	2.94	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Total gain 6 months			72.6	.....	.....		64.2	.....	.....		62.2	.....	.....		61.4	.....
Total gain 12 months			112.2	.....	.....		105.5	.....	.....			.....	.....		111.0	.....

* Five-month moving average.

Table 15.—Monthly hide thicknesses of Holstein, Ayrshire, Guernsey and Jersey males.

Age in months	HOLSTEIN			AYRSHIRE			GUERNSEY			JERSEY		
	Animals	Thickness of hide**		Animals	Thickness of hide**		Animals	Thickness of hide**		Animals	Thickness of hide**	
		Fore rib	Last rib		Fore rib	Last rib		Fore rib	Last rib		Fore rib	Last rib
Birth	<i>no.</i>	<i>mm.</i>	<i>mm.</i>	<i>no.</i>	<i>mm.</i>	<i>mm.</i>	<i>no.</i>	<i>mm.</i>	<i>mm.</i>	<i>no.</i>	<i>mm.</i>	<i>mm.</i>
1	211	3.5	3.6	58*	3.8	3.9	25	3.2	3.4	90	3.0	3.0
2	176	3.3	3.5	42	3.7	4.0	19	3.0	3.3	78	2.8	3.0
3	148	3.7	3.8	28	3.9	4.0	17	3.3	3.5	65	3.1	3.2
4	136*	4.0	4.1	23	4.0	4.2	14	3.6	3.7	56	3.3	3.4
5	119	4.5	4.5	15	4.4	4.5	10	4.1	4.2	51	3.7	3.8
6	108	5.0	5.1	12	5.0	5.1	9	4.6	4.7	41	4.2	4.2
7	96	5.6	5.7	12	5.6	5.8	8	5.2	5.2	31	4.7	4.8
8	77	6.2	6.4	10	6.2	6.3	6	5.9	5.8	23	5.4	5.4
9	70	6.7	6.9	6	6.8	7.0	3	7.2	7.2	13	6.0	6.1
10	59	7.1	7.3	4	7.5	7.7	.....	.....	.....	8	6.8	6.9
11	43	7.4	7.7	4	8.0	8.4	.....	.....	.....	4	7.6	7.6
12	37*	7.6	7.8	3	8.4	9.0	.....	.....	.....	3	9.0	9.0
13	22	7.7	8.0	3	8.8	9.3	.....	.....	.....	1	10.0	9.0
14	16*	7.8	8.1	1	9.3	9.7	.....	.....	.....	.....	.....	.....
15	10	7.9	8.2	1	9.1	9.6	.....	.....	.....	.....	.....	.....
16	9	8.0	8.3	1	9.0	7.5	.....	.....	.....	.....	.....	.....
17	7	8.1	8.5	1	8.0	9.5	.....	.....	.....	.....	.....	.....
18	5	8.3	8.7	.....	.....	.....	.....	.....	.....	.....	.....	.....
19	4	8.4	8.8	.....	.....	.....	.....	.....	.....	.....	.....	.....
20	3	8.3	8.7	.....	.....	.....	.....	.....	.....	.....	.....	.....
21	3	8.3	8.7	.....	.....	.....	.....	.....	.....	.....	.....	.....
22	3	8.3	8.4	.....	.....	.....	.....	.....	.....	.....	.....	.....
23	3	8.3	8.6	.....	.....	.....	.....	.....	.....	.....	.....	.....
24	2	8.2	8.3	.....	.....	.....	.....	.....	.....	.....	.....	.....
25	1	8.1	8.2	.....	.....	.....	.....	.....	.....	.....	.....	.....
26	1	9.0	8.0	.....	.....	.....	.....	.....	.....	.....	.....	.....
27	1	8.0	8.0	.....	.....	.....	.....	.....	.....	.....	.....	.....

All millimeter figures represent double the thickness of the hide.

* Last rib—one less animal.

** Five-month moving average.

Table 16. Monthly angle of rump of Holstein, Ayrshire, Guernsey and Jersey males.

Age in months	HOLSTEIN		AYRSHIRE		GUERNSEY		JERSEY	
	Animals	Slope of rump*	Animals	Slope of rump*	Animals	Slope of rump*	Animals	Slope of rump*
Birth	<i>no.</i>	<i>degrees</i>	<i>no.</i>	<i>degrees</i>	<i>no.</i>	<i>degrees</i>	<i>no.</i>	<i>degrees</i>
1	144	5.48	45	6.60	16	5.72	55	4.86
2	112	3.15	31	5.34	10	4.75	43	2.97
3	91	3.33	23	5.23	10	4.10	39	2.94
4	84	2.42	16	4.28	8	3.21	34	2.01
5	74	2.23	13	3.54	5	2.44	34	1.67
6	65	2.19	10	3.03	5	3.10	28	1.51
7	60	2.43	11	2.84	5	2.00	22	1.55
8	47	2.59	9	2.58	3	2.00	16	1.45
9	41	2.83	5	2.61	1	4.00	7	1.87
10	34	3.00	4	2.94	.....	.....	4	2.29
11	25	3.24	4	3.18	.....	.....	2	3.69
12	21	3.27	3	3.20	.....	.....	2	3.25
13	11	3.49	3	3.71	.....	.....	1	7.00
14	6	3.67	1	3.94	.....	.....	.....	.....
15	5	3.86	1	3.79	.....	.....	.....	.....
16	5	4.20	1	3.00	.....	.....	.....	.....
17	5	4.52	1	4.00	.....	.....	.....	.....
18	4	4.52	.....	.....	.....	.....	.....	.....
19	3	4.72	.....	.....	.....	.....	.....	.....
20	3	4.91	.....	.....	.....	.....	.....	.....
21	3	5.20	.....	.....	.....	.....	.....	.....
22	3	5.67
23	3	6.43
24	3	6.08
25	2	6.60
26	1	7.00
27	1	8.00
27	1	10.00

* Five-month moving average.

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